WHAT IS CLAIMED IS:

1. A method for processing signals in a pulse oximeter to determine oxygen saturation and pulse rate, comprising:

receiving waveforms corresponding to two different wavelengths of light from a patient;

ensemble averaging said waveforms in a first ensemble averager;

calculating a pulse rate based on an output of said first ensemble averager;

normalizing said waveforms to produce normalized waveforms;

ensemble averaging said normalized waveforms in a second ensemble averager; and

calculating an oxygen saturation based on an output of said second ensemble averager.

2. The method of claim 1 further comprising:

said ensemble averaging using variable weights;

selecting first metrics for said first ensemble averager to optimize said calculating a pulse rate; and

selecting second metrics for said second ensemble averager to optimize said calculating an oxygen saturation.

3. The method of claim 2 wherein said first and second metrics both include an arrhythmia metric for detecting an arrhythmic pulse, said arrhythmia metric for said first metrics, in connection with calculating a pulse rate, having a lower associated threshold for recognizing arrhythmia than said arrhythmic metric for said second metrics.

4. The method of claim 2 wherein said first and second metrics both include a short term metric which is a measure of short-term changes in pulse amplitude;

said first ensemble averager increasing an ensemble averaging weight in response to a short-term decrease in pulse amplitude faster than said second ensemble averager.

5. A pulse oximeter for determining oxygen saturation and pulse rate, comprising:

a detector which receives waveforms corresponding to two different wavelengths of light from a patient;

a first ensemble averager;

a pulse rate calculator, coupled to an output of said first ensemble averager;

a normalizer coupled to said detector for normalizing said waveforms to produce normalized waveforms;

a second ensemble averager; and

an oxygen saturation calculator coupled to an output of said second ensemble averager.

6. The pulse oximeter of claim 5 further comprising:

wherein said ensemble averagers are configured to ensemble average using variable weights;

a signal quality metric calculator configured to provide first metrics for said first ensemble averager to optimize said calculating a pulse rate, and second metrics for said second ensemble averager to optimize said calculating an oxygen saturation.

7. A method for processing signals in a pulse oximeter to determine oxygen saturation and pulse rate, comprising:

receiving waveforms corresponding to two different wavelengths of light from a patient;

low pass filtering said waveforms in a first low pass filter;

calculating a pulse rate based on an output of said first low pass filter;

normalizing said waveforms to produce normalized waveforms;

low pass filtering said normalized waveforms in a second low pass filter; and

calculating an oxygen saturation based on an output of said second low pass filter.

8. The method of claim 7 further comprising:

selecting first metrics for said first low pass filter to optimize said calculating a pulse rate; and

selecting second metrics for said second low pass filter to optimize said calculating an oxygen saturation.

9. The method of claim 8 wherein:

the low-pass filtering weight associated with said first low pass filter is based on a frequency ratio metric which quantifies the frequency-content of said waveforms relative to a pulse-rate estimate.

10. The method of claim 8 wherein:

a low-pass filtering weight for said second low pass filter is based on

a frequency ratio metric which quantifies the frequency-content of said waveforms relative to a pulse-rate estimate that metric, and

a separate Ratio-of-Ratios variance metric.

11. A method for processing signals in a pulse oximeter to determine oxygen saturation and pulse rate, comprising:

receiving waveforms corresponding to two different wavelengths of light from a patient;

low pass filtering and ensemble averaging said waveforms in a first low pass filter and ensemble averager;

calculating a pulse rate based on an output of said first low pass filter and ensemble averager;

normalizing said waveforms to produce normalized waveforms;

low pass filtering and ensemble averaging said normalized waveforms in a second low pass filter and ensemble averager; and

calculating an oxygen saturation based on an output of said second low pass filter and ensemble averager.

12. A pulse oximeter for determining oxygen saturation and pulse rate, comprising:

a detector which receives waveforms corresponding to two different wavelengths of light from a patient;

a first low pass filtering;

a pulse rate calculator, coupled to an output of said first low pass filter;

a normalizer coupled to said detector for normalizing said waveforms to produce normalized waveforms;

a second low pass filter; and

an oxygen saturation calculator coupled to an output of said second low pass filter.

13. The pulse oximeter of claim 12 further comprising:

wherein said low pass filters are configured to ensemble average using variable weights;

a signal quality metric calculator configured to provide first metrics for said first low pass filter to optimize said calculating a pulse rate, and second metrics for said second low pass filter to optimize said calculating an oxygen saturation.

14. The pulse oximeter of claim 12 wherein:

the low-pass filtering weight associated with said first low pass filter is based on a frequency ratio metric which which quantifies the frequency-content of said waveforms relative to a pulse-rate estimate.

15. The pulse oximeter of claim 12 wherein:

a low-pass filtering weight for said second low pass filter is based on

a frequency ratio metric which which quantifies the frequency-content of said waveforms relative to a pulse-rate estimate that metric, and

a separate Ratio-of-Ratios variance metric.

16. A pulse oximeter for determining oxygen saturation and pulse rate, comprising:

a detector which receives waveforms corresponding to two different wavelengths of light from a patient;

a first low pass filtering and ensemble averager;

a pulse rate calculator, coupled to an output of said first low pass filter and ensemble averager;

a normalizer coupled to said detector for normalizing said waveforms to produce normalized waveforms;

a second low pass filter and ensemble averager; and

an oxygen saturation calculator coupled to an output of said second low pass filter and ensemble averager.

17. A method for processing signals in a pulse oximeter to determine oxygen saturation, comprising:

receiving waveforms corresponding to two different wavelengths of light from a patient;

processing a new waveform after a pulse period trigger to ensemble average with a historical average waveform; and

when said new waveform differs from said historical average waveform by more than a predetermined threshold, interpolating between the new waveform and the historical average waveform for a first few samples of a new, composite historical average waveform.

18. The method of claim 17 wherein said first few samples are four samples, and said interpolations are at 80%, 60%, 40%, and 20% of the difference between the new waveform and the historical average waveform.